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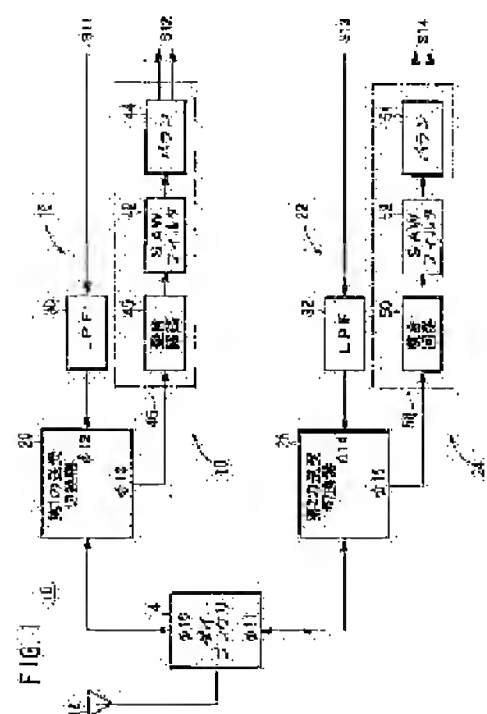
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(54) TRANSMITTER/RECEIVER



(57)Abstract:

PROBLEM TO BE SOLVED: To suppress the deterioration of receiving characteristics of a signal by making available a SAW filter in the unbalanced output system of high characteristics.

SOLUTION: The device has a diplexer 14 connected to an antenna 12, a first transmitting/receiving switcher 20 connected to the diplexer 14 for switching a first transmitting system 16 and a first receiving system 18, and a second transmitting/receiving switcher 26 connected to the diplexer 14 for switching a second transmitting system 22 and a second receiving system 24. A first serial circuit 46 composed of a matching circuit 40, a SAW filter 42 in the unbalanced output system and an unbalanced/balanced converting circuit 44 is connected to the first receiving system 18, and a second serial circuit 56 composed of a matching circuit 50, a SAW filter 52 in the unbalanced output system and

an unbalanced/balanced converting circuit 54 is connected to the second receiving system 24.

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CLAIMS

[Claim(s)]

[Claim 1] The branch circuit which it connects [branch circuit] with an antenna and passes the transceiver signal of at least two kinds of frequency bands, The 1st duplexer which is connected to one input/output terminal of said branch circuit, and switches the 1st transmitting system and the 1st receiving system, Connect with the input/output

terminal of another side of said branch circuit, and it has the 2nd duplexer which switches the 2nd transmitting system and the 2nd receiving system. The transmitter-receiver characterized by connecting the series circuit by the SAW filter of an unbalanced output, and the unbalance-balance conversion circuit to said 1st and 2nd receiving systems at least, respectively.

[Claim 2] Said transmitter-receiver is a transmitter-receiver to which it is characterized by carrying out the interior of the circuit element from which it consists of electronic parts with which it is mounted in a ceramic substrate and this ceramic substrate front face at least in a transmitter-receiver according to claim 1, and said 1st duplexer and said 2nd duplexer are constituted in said ceramic substrate.

[Claim 3] It is the transmitter-receiver characterized by forming said unbalance-balance conversion circuit into said ceramic substrate in a transmitter-receiver according to claim 2.

[Claim 4] The transmitter-receiver characterized by the dielectric constant of the part which constitutes the part of said unbalance-balance conversion circuit among said ceramic substrates being 50 or more in a transmitter-receiver according to claim 3.

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.....
DETAILED DESCRIPTION

.....
[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the transmitter-receiver which can share transmission of two or more kinds of sending signals, and the input of two or more kinds of input signals with the antenna equipment of a single.

[0002]

[Description of the Prior Art] Recently, mobile communication, a cellular phone, etc. which cover the system of two frequency bands with one antenna are put in practical use. For example, in Europe, they are [in 900GSM (900MHz), 1800DCSs (1.8GHz), and the U.S.] 800PDC (800MHz) and 1900PHS (1.9GHz) at 900 D-AMPS (900MHz), 1900PCSeS (1.9GHz), and Japan.

[0003] Since these two frequency bands are covered with one antenna, the transmitter-receiver 100 as shown in drawing 8 is used (for example, refer to JP, 2001-211097, A).

[0004] This transmitter-receiver 100 has the diplexer 104 connected to the antenna 102, the 1st duplexer 106 which is connected to this diplexer 104 and switches transmission and reception of the signal of the 1st frequency band, and the 2nd duplexer 108 which is connected to said diplexer 104 and switches transmission and reception of the signal of the 2nd frequency band. Moreover, low pass filters 110 and 112 are connected to each transmitting side of the 1st and 2nd duplexers 106 and 108, respectively.

[0005] The sending signal S11 of the 1st frequency band is inputted into one low pass filter 110, and the sending signal S13 of the 2nd frequency band is inputted into the low pass filter 112 of another side.

[0006] SAW filter 116 of a matching circuit 114 and a balanced output method is connected to the latter part of the 1st duplexer 106, and from this SAW filter 116, the input signal S12 of the 1st frequency band is outputted, and it is inputted into the low noise amplifier of the balanced input method of the latter part which is not illustrated.

[0007] SAW filter 120 of a matching circuit 118 and a balanced output method is connected to the latter part of the 2nd duplexer 108, and from this SAW filter 120, the input signal S14 of the 2nd frequency band is outputted, and it is inputted into the low noise amplifier of the balanced input method of the latter part which is not illustrated.

[0008]

[Problem(s) to be Solved by the Invention] By the way, he is trying for SAW filters 116 and 120 connected to each receiving system to use both SAW filters 116 and 120 of a balanced output method from the need of connecting the low noise amplifier of a balanced input method to the latter part. However, generally, the SAW filter of a balanced output method has a property worse than the SAW filter of an unbalanced output method, and has a possibility that the receiving property of a signal may deteriorate.

[0009] This invention is made in consideration of such a technical problem, the SAW filter of an unbalanced output method with a sufficient

property can be used, and it aims at offering the transmitter-receiver which can control degradation of the receiving property of a signal.

[0010]

[Means for Solving the Problem] The branch circuit which the transmitter-receiver concerning this invention is connected [branch circuit] to an antenna, and passes the transceiver signal of at least two kinds of frequency bands, The 1st duplexer which is connected to one input/output terminal of said branch circuit, and switches the 1st transmitting system and the 1st receiving system, Connect with the input/output terminal of another side of said branch circuit, and it has the 2nd duplexer which switches the 2nd transmitting system and the 2nd receiving system. It is characterized by connecting the series circuit by the SAW filter of an unbalanced output, and the unbalance-balance conversion circuit to said 1st and 2nd receiving systems at least, respectively.

[0011] Thereby, the SAW filter of an unbalanced output method with a sufficient property can be used for a receiving system (the 1st and 2nd receiving systems are included), and degradation of the receiving property of a signal can be controlled.

[0012] And the interior of the circuit element which said transmitter-receiver consists of a ceramic substrate and electronic parts mounted in this ceramic substrate front face at least, and constitutes said 1st duplexer and said 2nd duplexer in said ceramic substrate may be carried out.

[0013] In this case, said unbalance-balance conversion circuit may be formed into said ceramic substrate. In this configuration, it is desirable that the dielectric constant of the part which constitutes the part of said unbalance-balance conversion circuit among said ceramic substrates is 50 or more.

[0014]

[Embodiment of the Invention] Hereafter, the example of a gestalt of operation of the transmitter-receiver concerning this invention is explained, referring to drawing 1 - drawing 7 .

[0015] One diplexer 14 which is connected to an antenna 12 and has the 1st and 2nd input/output terminals phi10 and phi11 as the transmitter-receiver 10 concerning the gestalt of this operation is shown in drawing 1 R> 1, The 1st duplexer 20 which is connected to the 1st input/output terminal phi 10 of this diplexer 14, and switches the 1st transmitting system 16 and the 1st receiving system 18, It connects with the 2nd input/output terminal phi 11 of said diplexer 14, and has the 2nd duplexer 26 which switches the 2nd transmitting system 22 and the 2nd

receiving system 24.

[0016] The sending signal S11 of the 1st frequency band (for example, 800MHz band) is inputted into the 1st transmitting system 16, and the input signal S12 of a 800MHz band is outputted from the 1st receiving system 18. Moreover, the sending signal S13 of the 2nd frequency band (for example, 1.8GHz band) is inputted into the 2nd transmitting system 22, and the input signal S14 of a 1.8GHz band is outputted from the 2nd receiving system 24.

[0017] In order to make a transmitting property good especially, the low pass filter (the 1st and 2nd low pass filters 30 and 32) is connected to the 1st and 2nd transmitting systems 16 and 22, respectively. Therefore, the sending signal S11 of said 800MHz band is inputted into the 1st low pass filter 30, and the sending signal S13 of said 1.8GHz band is inputted into the 2nd low pass filter 32.

[0018] And the 1st series circuit 46 by the matching circuit 40, SAW filter 42 of an unbalanced output method, and the unbalance-balance conversion circuit (balun) 44 is connected to the 1st receiving system 18, and from this 1st series circuit 46, the input signal S12 of a 800MHz band is outputted, and it is inputted into the low noise amplifier of the balanced input method of the latter part which is not illustrated.

[0019] The 2nd series circuit 56 by the matching circuit 50, SAW filter 52 of an unbalanced output method, and the unbalance-balance conversion circuit (balun) 54 is connected to the 2nd receiving system 24, and from this 2nd series circuit 56, the input signal S14 of a 1.8GHz band is outputted, and it is inputted into the low noise amplifier of the balanced input method of the latter part which is not illustrated.

[0020] Here, one example of an experiment is shown. This example of an experiment sees change of the magnitude of attenuation to the insertion loss of the SAW filter of a balanced output method, and the SAW filter of an unbalanced output method.

[0021] An experimental result is shown in drawing 2 . In this drawing 2 , the plot shown by ** and ** is the property of the SAW filter of an unbalanced output method, and the plot shown by - and 0 is the property of the SAW filter of a balanced output method. From this result, the SAW filter of the magnitude of attenuation at the time of the same insertion loss of balance system has become less than the SAW filter of an unbalance method, and it turns out on a property that the SAW filter of an unbalance method is better than the SAW filter of balance system.

[0022] Thus, in the transmitter-receiver 10 concerning the gestalt of this operation, since SAW filters 42 and 52 of an unbalanced output

method with a sufficient property can be used for the 1st and 2nd receiving systems 18 and 24, degradation of the receiving property of a signal can be controlled.

[0023] By the way, mounting of the 1st series circuit 46 or the 2nd series circuit 56 is explained, referring to drawing 3 - drawing 7 about the example of the concrete mounting technique of the 1st series circuit 46 typically, although various technique can be considered. This is the same also in the 2nd series circuit 56.

[0024] (1) As shown in drawing 3 , mount the single electronic parts 60 which have the dielectric base with which the matching circuit 40 was formed, the single electronic parts 62 which have the dielectric base with which SAW filter 42 of an unbalanced output method was formed, and the single electronic parts 64 which have the dielectric base with which the unbalance-balance conversion circuit 44 was formed for example, on a ceramic substrate 66.

[0025] (2) As shown in drawing 4 , mount the compound electronic parts 68 which have the dielectric base with which the matching circuit 40 and SAW filter 42 were formed, and the single electronic parts 64 which have the dielectric base with which the unbalance-balance conversion circuit 44 was formed on a ceramic substrate 66.

[0026] (3) As shown in drawing 5 , mount the single electronic parts 60 which have the dielectric base with which the matching circuit 40 was formed, and the compound electronic parts 70 which have the dielectric base with which SAW filter 42 and the unbalance-balance conversion circuit 44 were formed on a ceramic substrate 66.

[0027] (4) As shown in drawing 6 , mount the compound electronic parts 72 which have the dielectric base with which the matching circuit 40 and the unbalance-balance conversion circuit 44 were formed, and the single electronic parts 62 which have the dielectric base with which SAW filter 42 was formed on a ceramic substrate 66.

[0028] (5) As shown in drawing 7 , mount the compound electronic parts 74 which have the dielectric base with which the matching circuit 40, SAW filter 42, and the unbalance-balance conversion circuit 44 were formed on a ceramic substrate 66.

[0029] The technique shown in (5) among such mounting technique can constitute one receiving system (1st receiving system 18 in this case) only from mounting one compound electronic parts 74 on a ceramic substrate 66. This is the same also in the 2nd receiving system 24. Thus, component mounting becomes easy first by adopting the technique shown in (5). And since the tooth space between components can be excluded, the size of the transmitter-receiver 10 whole can be miniaturized more, and

a manufacturing cost can also be reduced.

[0030] In the various mounting technique mentioned above, it may be made to carry out the interior of the circuit element which constitutes the 1st duplexer 20 and the 2nd duplexer 26 in a ceramic substrate 66.

Moreover, it may be made to carry out the interior of the unbalance-balance conversion circuit 44 (balun) into a ceramic substrate 66. Of course, also in the 2nd receiving system 24, it is the same. By adopting these configurations, the miniaturization of the size of a transmitter-receiver 10 can be attained further.

[0031] Moreover, as for the balun which is the unbalance-balance conversion circuit 44, a configuration is decided by wavelength. Therefore, in order to miniaturize a balun 44, it is desirable that the dielectric constant of the part in which a balun 44 is formed among the various dielectric bases which constitute the single electronic parts 64 and the compound electronic parts 70, 72, and 74, or a ceramic substrate 66 is 50 or more (when the interior of the balun 44 is carried out). Of course, also in the balun 54 of the 2nd receiving system 24, it is the same.

[0032] In addition, the transmitter-receiver concerning this invention of the ability of various configurations to be taken is natural, without deviating not only from the gestalt of above-mentioned operation but from the summary of this invention.

[0033]

[Effect of the Invention] As explained above, according to the transmitter-receiver concerning this invention, the SAW filter of an unbalanced output method with a sufficient property can be used, and degradation of the receiving property of a signal can be controlled.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the transmitter-receiver concerning the gestalt of this operation.

[Drawing 2] It is the property Fig. showing change of the magnitude of attenuation to the insertion loss of the SAW filter of a balanced output method, and the SAW filter of an unbalanced output method.

[Drawing 3] It is the explanatory view showing the 1st example in the mounting technique of the 1st series circuit.

[Drawing 4] It is the explanatory view showing the 2nd example in the mounting technique of the 1st series circuit.

[Drawing 5] It is the explanatory view showing the 3rd example in the mounting technique of the 1st series circuit.

[Drawing 6] It is the explanatory view showing the 4th example in the mounting technique of the 1st series circuit.

[Drawing 7] It is the explanatory view showing the 5th example in the mounting technique of the 1st series circuit.

[Drawing 8] It is the block diagram showing the configuration of the transmitter-receiver concerning the conventional example.

[Description of Notations]

10 -- Transmitter-receiver 12 -- Antenna

14 -- Diplexer 16 -- 1st transmitting system

18 -- 1st receiving system 20 -- The 1st duplexer

22 -- 2nd transmitting system 24 -- 2nd receiving system

26 -- The 2nd duplexer

42 -- SAW filter of an unbalanced output method

44 -- Unbalance-balance conversion circuit (balun) 46 -- The 1st series circuit

50 -- Matching circuit

52 -- SAW filter of an unbalanced output method

54 -- Unbalance-balance conversion circuit (balun)

56 -- The 2nd series circuit

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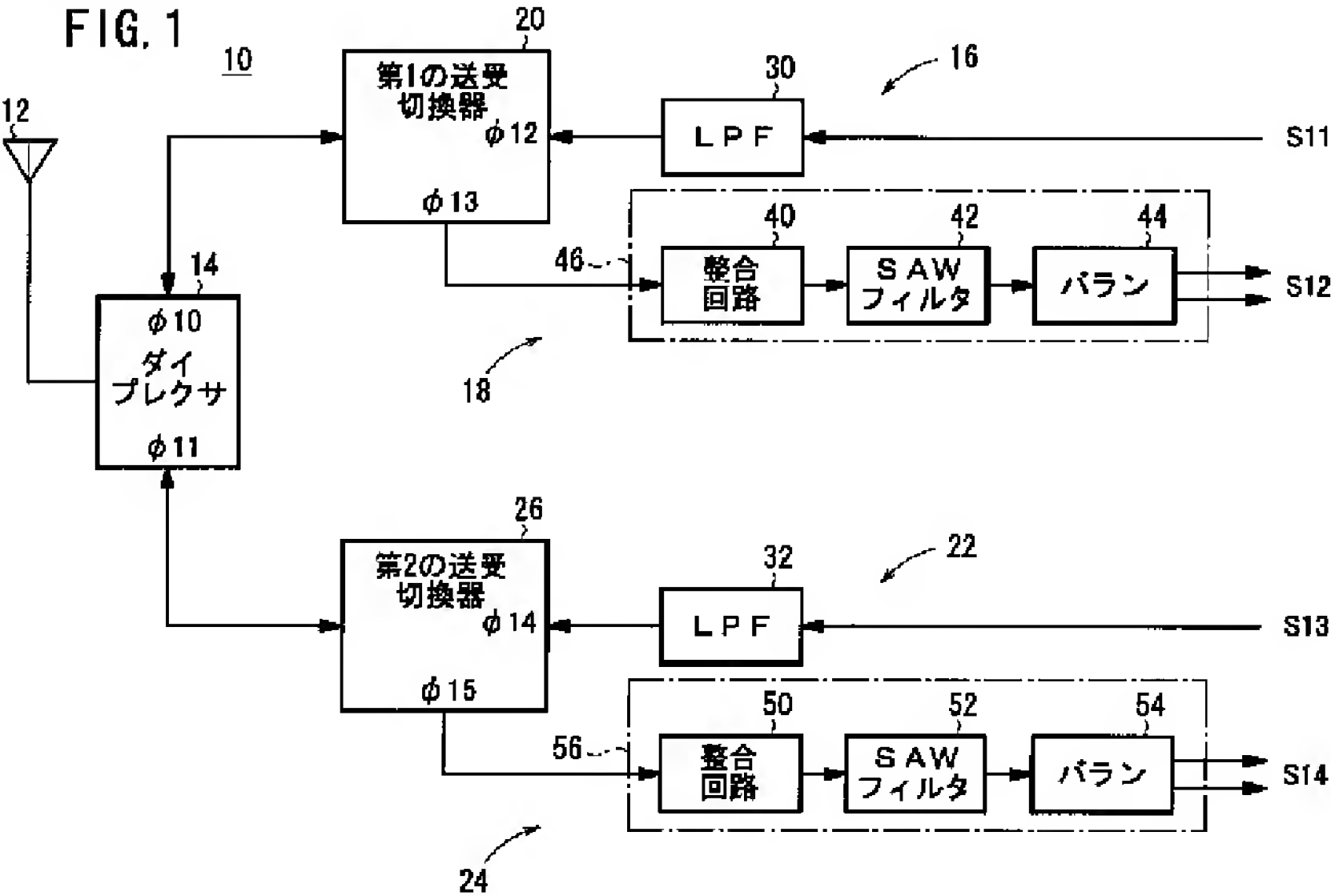
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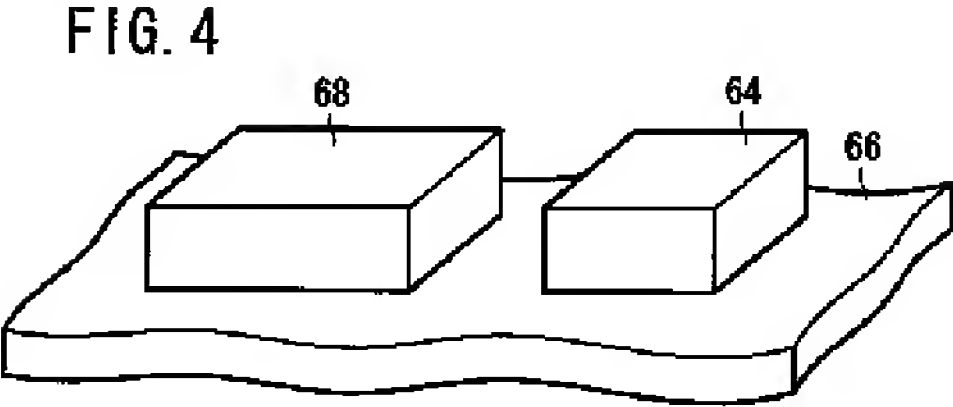
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DRAWINGS

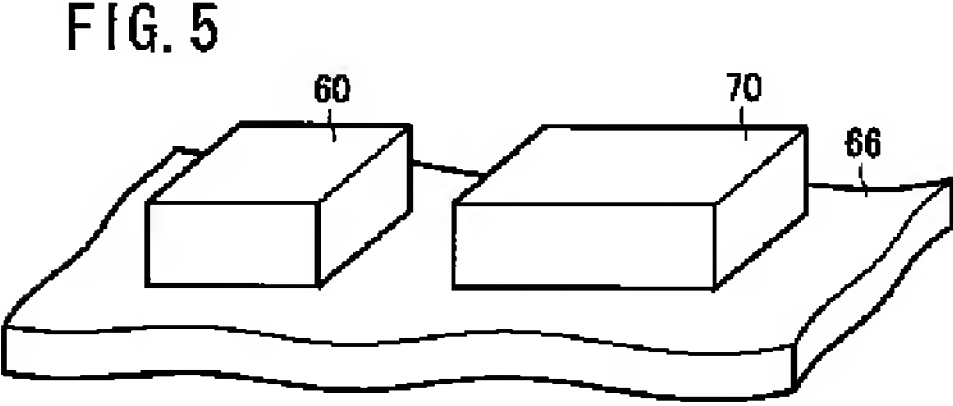
[Drawing 1]



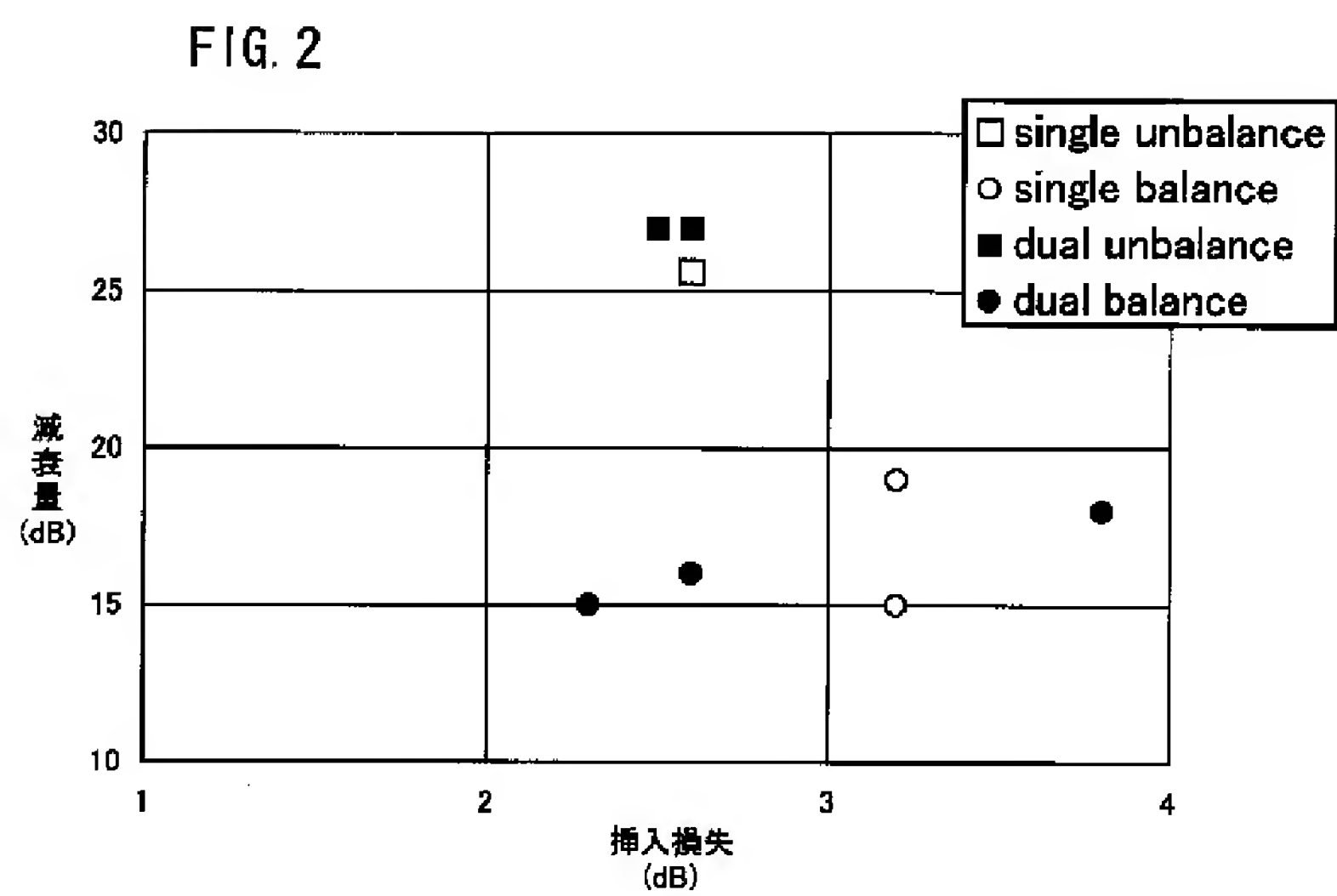
[Drawing 4]



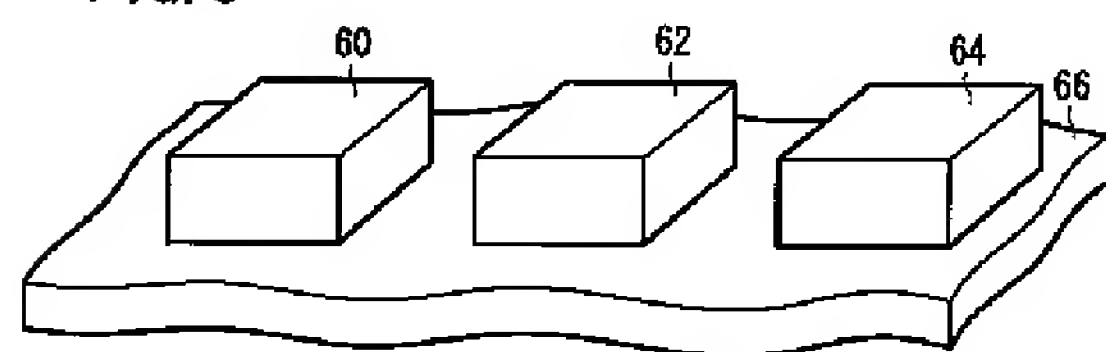
[Drawing 5]



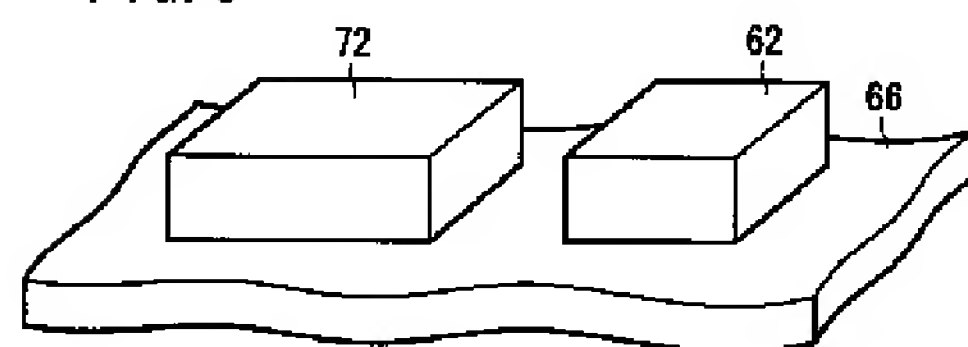
[Drawing 2]



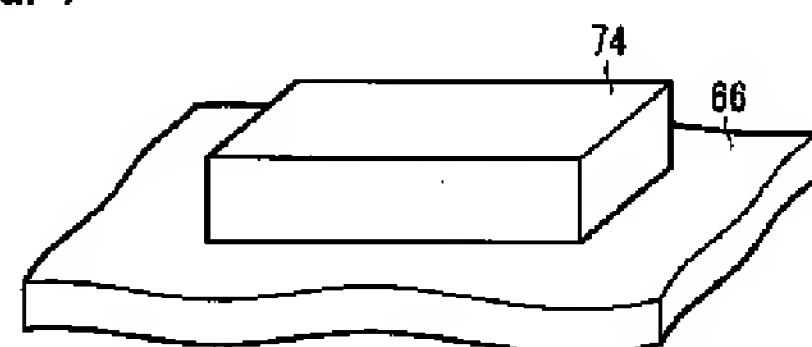
[Drawing 3]
FIG. 3



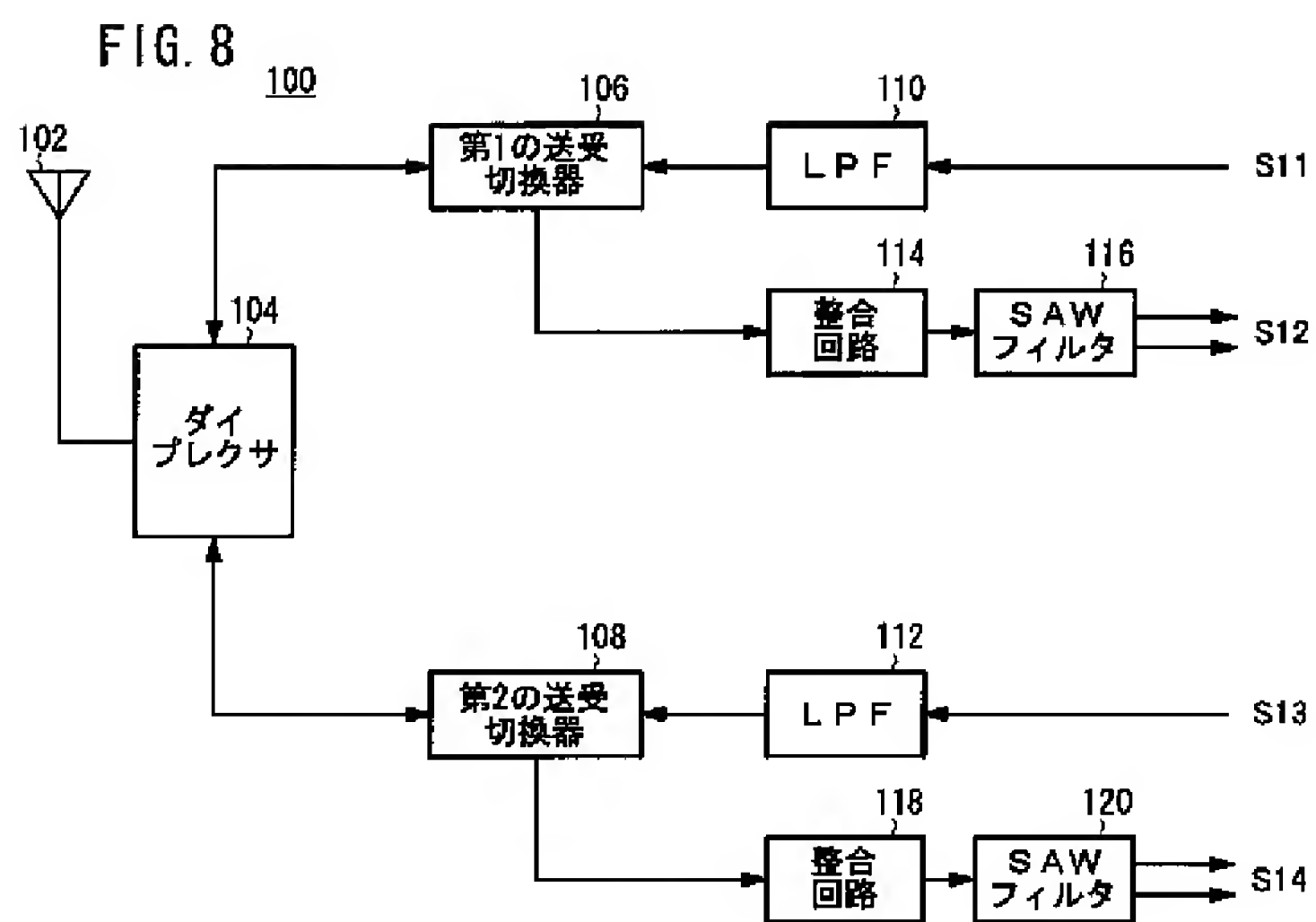
[Drawing 6]
FIG. 6



[Drawing 7]
FIG. 7



[Drawing 8]



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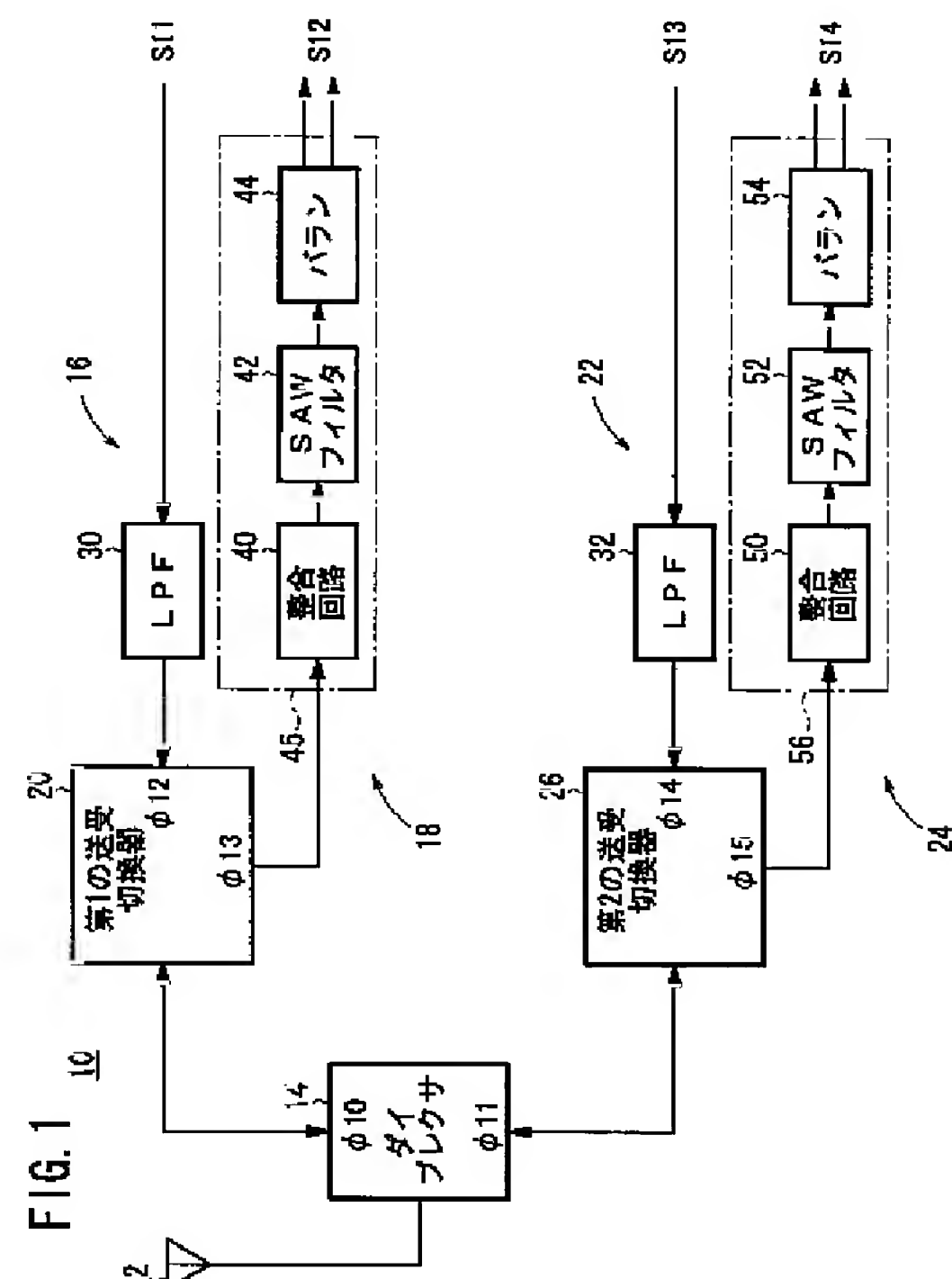
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(54) 【発明の名称】 送受信装置

(57) 【要約】

【課題】特性のよい不平衡出力方式のSAWフィルタを使用できるようにして、信号の受信特性の劣化を抑制する。

【解決手段】アンテナ１２に接続されたダイプレクサ１４と、該ダイプレクサ１４に接続され、第１の送信系１６と第１の受信系１８とを切り換える第１の送受切換器２０と、前記ダイプレクサ１４に接続され、第２の送信系２２と第２の受信系２４とを切り換える第２の送受切換器２６とを有する。第１の受信系１８には、整合回路４０と不平衡出力方式のＳＡＷフィルタ４２と不平衡－平衡変換回路４４による第１の直列回路４６が接続され、第２の受信系２４には、整合回路５０と不平衡出力方式のＳＡＷフィルタ５２と不平衡－平衡変換回路５４による第２の直列回路５６が接続される。



【特許請求の範囲】

【請求項1】アンテナに接続され、少なくとも2種類の周波数帯の送受信信号を通過させる分波回路と、前記分波回路の一方の入出力端子に接続され、第1の送信系と第1の受信系とを切り換える第1の送受切換器と、前記分波回路の他方の入出力端子に接続され、第2の送信系と第2の受信系とを切り換える第2の送受切換器とを有し、前記第1及び第2の受信系に少なくとも不平衡出力のSAWフィルタと不平衡－平衡変換回路による直列回路がそれぞれ接続されていることを特徴とする送受信装置。

【請求項2】請求項1記載の送受信装置において、前記送受信装置は、少なくともセラミック基板と、該セラミック基板表面に実装される電子部品から構成され、前記セラミック基板中に前記第1の送受切換器、前記第2の送受切換器を構成する回路素子が内装されていることを特徴とする送受信装置。

【請求項3】請求項2記載の送受信装置において、前記不平衡－平衡変換回路は、前記セラミック基板中に形成されていることを特徴とする送受信装置。

【請求項4】請求項3記載の送受信装置において、前記セラミック基板のうち、前記不平衡－平衡変換回路の部分を構成する部位の誘電率が50以上であることを特徴とする送受信装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、2種類以上の送信信号の伝送と2種類以上の受信信号の入力を、例えば単一のアンテナ装置で共用することができる送受信装置に関する。

【0002】

【従来の技術】近時、2つの周波数帯域のシステムを1つのアンテナでカバーする移動通信や携帯電話等が実用化されている。例えば、欧州では900GSM(900MHz)と1800DCS(1.8GHz)、米国では900D-AMPS(900MHz)と1900PCS(1.9GHz)、日本では800PDC(800MHz)と1900PHS(1.9GHz)である。

【0003】これら2つの周波数帯域を1本のアンテナでカバーするために、図8に示すような送受信装置100が使われている(例えば特開2001-211097号公報参照)。

【0004】この送受信装置100は、アンテナ102に接続されたダイプレクサ104と、該ダイプレクサ104に接続され、第1の周波数帯の信号の送受信を切り換える第1の送受切換器106と、前記ダイプレクサ104に接続され、第2の周波数帯の信号の送受信を切り換える第2の送受切換器108とを有する。また、第1及び第2の送受切換器106及び108の各送信側に

は、それぞれローパスフィルタ110及び112が接続されている。

【0005】一方のローパスフィルタ110には、第1の周波数帯の送信信号S11が入力され、他方のローパスフィルタ112には、第2の周波数帯の送信信号S13が入力されるようになっている。

【0006】第1の送受切換器106の後段には整合回路114と平衡出力方式のSAWフィルタ116が接続され、該SAWフィルタ116からは、第1の周波数帯の受信信号S12が出力され、図示しない後段の平衡入力方式のローノイズアンプに入力される。

【0007】第2の送受切換器108の後段には整合回路118と平衡出力方式のSAWフィルタ120が接続され、該SAWフィルタ120からは、第2の周波数帯の受信信号S14が出力され、図示しない後段の平衡入力方式のローノイズアンプに入力される。

【0008】

【発明が解決しようとする課題】ところで、各受信系に接続されたSAWフィルタ116及び120は、後段に平衡入力方式のローノイズアンプを接続させる必要から、共に平衡出力方式のSAWフィルタ116及び120を使用するようにしている。しかし、平衡出力方式のSAWフィルタは、一般に不平衡出力方式のSAWフィルタよりも特性が悪く、信号の受信特性が劣化するおそれがある。

【0009】本発明はこのような課題を考慮してなされたものであり、特性のよい不平衡出力方式のSAWフィルタを使用することができ、信号の受信特性の劣化を抑制することができる送受信装置を提供することを目的とする。

【0010】

【課題を解決するための手段】本発明に係る送受信装置は、アンテナに接続され、少なくとも2種類の周波数帯の送受信信号を通過させる分波回路と、前記分波回路の一方の入出力端子に接続され、第1の送信系と第1の受信系とを切り換える第1の送受切換器と、前記分波回路の他方の入出力端子に接続され、第2の送信系と第2の受信系とを切り換える第2の送受切換器とを有し、前記第1及び第2の受信系に少なくとも不平衡出力のSAWフィルタと不平衡－平衡変換回路による直列回路がそれぞれ接続されていることを特徴とする。

【0011】これにより、受信系(第1及び第2の受信系を含む)に特性のよい不平衡出力方式のSAWフィルタを使用することができ、信号の受信特性の劣化を抑制することができる。

【0012】そして、前記送受信装置は、少なくともセラミック基板と、該セラミック基板表面に実装される電子部品から構成され、前記セラミック基板中に前記第1の送受切換器、前記第2の送受切換器を構成する回路素子が内装されていてもよい。

【0013】この場合、前記不平衡—平衡変換回路は、前記セラミック基板中に形成されていてもよい。この構成において、前記セラミック基板のうち、前記不平衡—平衡変換回路の部分を構成する部位の誘電率が50以上であることが好ましい。

【0014】

【発明の実施の形態】以下、本発明に係る送受信装置の実施の形態例を図1～図7を参照しながら説明する。

【0015】本実施の形態に係る送受信装置10は、図1に示すように、アンテナ12に接続され、第1及び第2の入出力端子φ10及びφ11を有する1つのダイプレクサ14と、該ダイプレクサ14の第1の入出力端子φ10に接続され、第1の送信系16と第1の受信系18とを切り換える第1の送受切換器20と、前記ダイプレクサ14の第2の入出力端子φ11に接続され、第2の送信系22と第2の受信系24とを切り換える第2の送受切換器26とを有する。

【0016】第1の送信系16には第1の周波数帯（例えば800MHz帯）の送信信号S11が入力され、第1の受信系18からは800MHz帯の受信信号S12が出力される。また、第2の送信系22には第2の周波数帯（例えば1.8GHz帯）の送信信号S13が入力され、第2の受信系24からは1.8GHz帯の受信信号S14が出力される。

【0017】特に、送信特性を良好とするために、第1及び第2の送信系16及び22には、それぞれローパスフィルタ（第1及び第2のローパスフィルタ30及び32）が接続されている。従って、第1のローパスフィルタ30には、前記800MHz帯の送信信号S11が入力され、第2のローパスフィルタ32には、前記1.8GHz帯の送信信号S13が入力される。

【0018】そして、第1の受信系18には、整合回路40と不平衡出力方式のSAWフィルタ42と不平衡—平衡変換回路（バラン）44による第1の直列回路46が接続され、該第1の直列回路46からは、800MHz帯の受信信号S12が出力され、図示しない後段の平衡入力方式のローノイズアンプに入力される。

【0019】第2の受信系24には、整合回路50と不平衡出力方式のSAWフィルタ52と不平衡—平衡変換回路（バラン）54による第2の直列回路56が接続され、該第2の直列回路56からは、1.8GHz帯の受信信号S14が出力され、図示しない後段の平衡入力方式のローノイズアンプに入力される。

【0020】ここで、1つの実験例を示す。この実験例は、平衡出力方式のSAWフィルタと不平衡出力方式のSAWフィルタの挿入損失に対する減衰量の変化をみたものである。

【0021】実験結果を図2に示す。この図2において、■及び□で示すプロットが不平衡出力方式のSAWフィルタの特性であり、●及び○で示すプロットが平衡

出力方式のSAWフィルタの特性である。この結果から、同じ挿入損失のときの減衰量は、不平衡方式のSAWフィルタよりも平衡方式のSAWフィルタの方が少なくなっており、特性上、不平衡方式のSAWフィルタが平衡方式のSAWフィルタよりも良好であることがわかる。

【0022】このように、本実施の形態に係る送受信装置10においては、第1及び第2の受信系18及び24に、特性のよい不平衡出力方式のSAWフィルタ42及び52を使用することができることから、信号の受信特性の劣化を抑制することができる。

【0023】ところで、第1の直列回路46や第2の直列回路56の実装は、様々な手法が考えられるが、代表的に第1の直列回路46の具体的な実装手法の例について図3～図7を参照しながら説明する。これは、第2の直列回路56においても同様である。

【0024】（1）図3に示すように、整合回路40が形成された誘電体基体を有する単一電子部品60と、不平衡出力方式のSAWフィルタ42が形成された誘電体基体を有する単一電子部品62と、不平衡—平衡変換回路44が形成された誘電体基体を有する単一電子部品64とを例えばセラミック基板66上に実装する。

【0025】（2）図4に示すように、整合回路40及びSAWフィルタ42が形成された誘電体基体を有する複合電子部品68と、不平衡—平衡変換回路44が形成された誘電体基体を有する単一電子部品64とをセラミック基板66上に実装する。

【0026】（3）図5に示すように、整合回路40が形成された誘電体基体を有する単一電子部品60と、SAWフィルタ42及び不平衡—平衡変換回路44が形成された誘電体基体を有する複合電子部品70とをセラミック基板66上に実装する。

【0027】（4）図6に示すように、整合回路40及び不平衡—平衡変換回路44が形成された誘電体基体を有する複合電子部品72と、SAWフィルタ42が形成された誘電体基体を有する単一電子部品62とをセラミック基板66上に実装する。

【0028】（5）図7に示すように、整合回路40、SAWフィルタ42及び不平衡—平衡変換回路44が形成された誘電体基体を有する複合電子部品74をセラミック基板66上に実装する。

【0029】これらの実装手法のうち、（5）に示す手法は、セラミック基板66上に1つの複合電子部品74を実装するだけで1つの受信系（この場合、第1の受信系18）を構成することができる。これは、第2の受信系24においても同様である。このように、（5）に示す手法を採用することにより、まず、部品実装が容易になる。しかも、部品間のスペースを省くことができるため、送受信装置10全体のサイズをより小型化することができ、製造コストも低減することができる。

【0030】上述した様々な実装手法において、セラミック基板66中に、第1の送受切換器20、第2の送受切換器26を構成する回路素子を内装するようにしてもよい。また、セラミック基板66中に不平衡－平衡変換回路44（バラン）を内装するようにしてもよい。もちろん、第2の受信系24においても同様である。これらの構成を採用することにより、送受信装置10のサイズの小型化を更に図ることができる。

【0031】また、不平衡－平衡変換回路44であるバランは、波長によって形状が決まる。従って、バラン44を小型化するためには、単一電子部品64及び複合電子部品70、72及び74を構成する各種誘電体基体やセラミック基板66（バラン44を内装した場合）のうち、バラン44が形成される部分の誘電率が50以上であることが好ましい。もちろん、第2の受信系24のバラン54においても同様である。

【0032】なお、この発明に係る送受信装置は、上述の実施の形態に限らず、この発明の要旨を逸脱することなく、種々の構成を採り得ることはもちろんである。

【0033】

【発明の効果】以上説明したように、本発明に係る送受信装置によれば、特性のよい不平衡出力方式のSAWフィルタを使用することができ、信号の受信特性の劣化を抑制することができる。

【図面の簡単な説明】

【図1】本実施の形態に係る送受信装置の構成を示すブロック図である。

【図2】平衡出力方式のSAWフィルタと不平衡出力方式のSAWフィルタの挿入損失に対する減衰量の変化を示す特性図である。

【図3】第1の直列回路の実装手法における第1の例を示す説明図である。

【図4】第1の直列回路の実装手法における第2の例を示す説明図である。

【図5】第1の直列回路の実装手法における第3の例を示す説明図である。

【図6】第1の直列回路の実装手法における第4の例を示す説明図である。

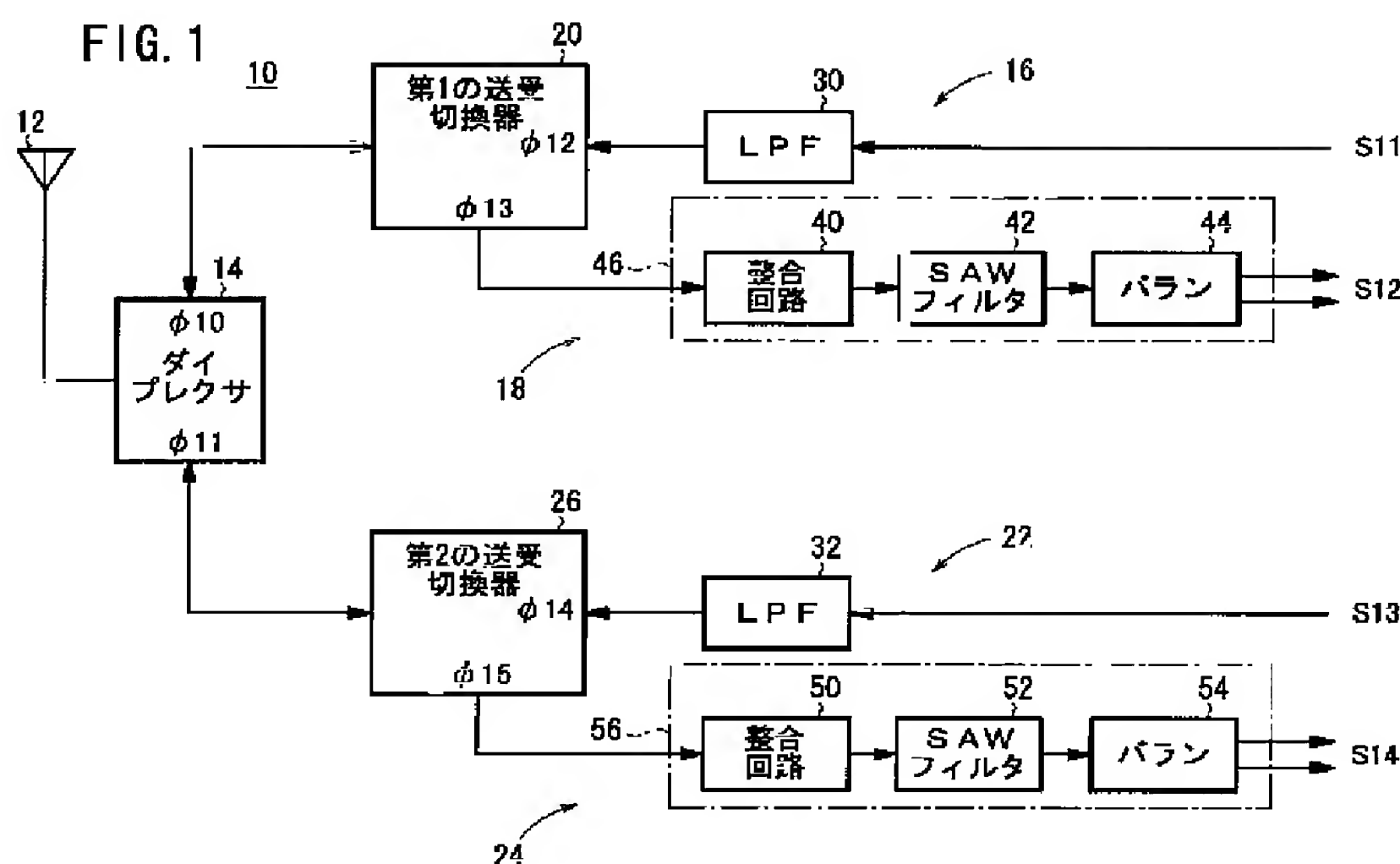
【図7】第1の直列回路の実装手法における第5の例を示す説明図である。

【図8】従来例に係る送受信装置の構成を示すブロック図である。

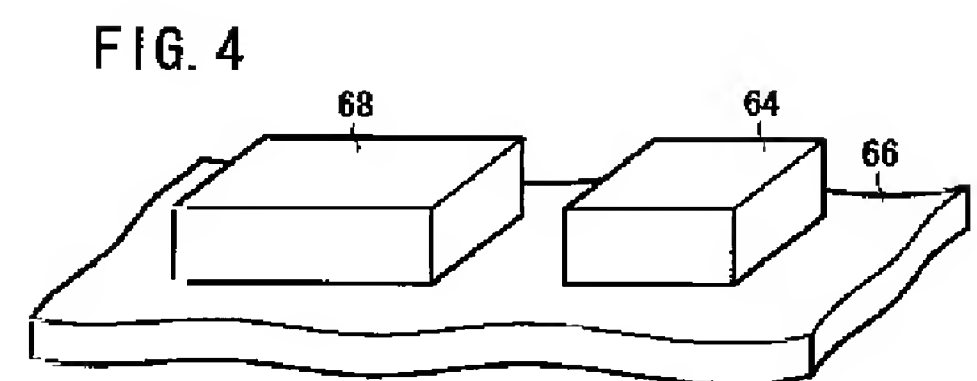
【符号の説明】

10…送受信装置	12…アンテナ
14…ダイプレクサ	16…第1の送信系
18…第1の受信系	20…第1の送受切換器
22…第2の送信系	24…第2の受信系
26…第2の送受切換器	
42…不平衡出力方式のSAWフィルタ	
44…不平衡－平衡変換回路（バラン）	46…第1の直列回路
50…整合回路	
52…不平衡出力方式のSAWフィルタ	
54…不平衡－平衡変換回路（バラン）	
56…第2の直列回路	

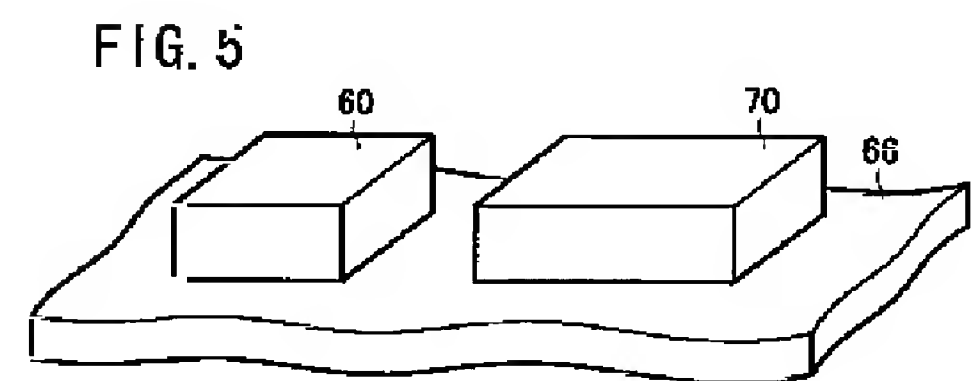
【図1】



【図4】

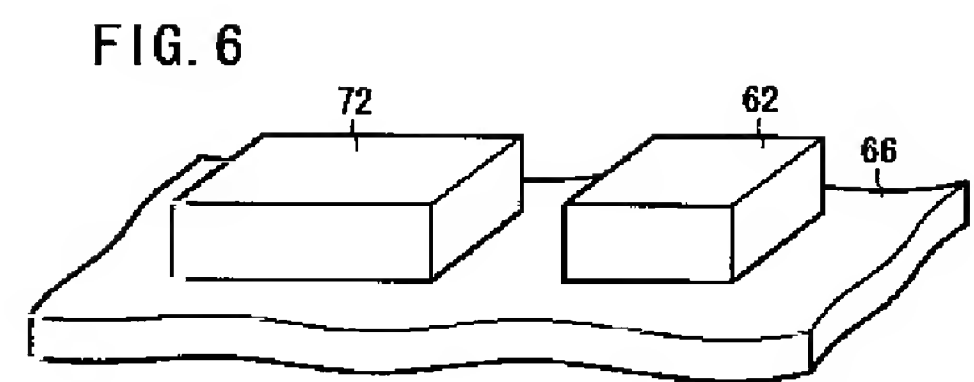
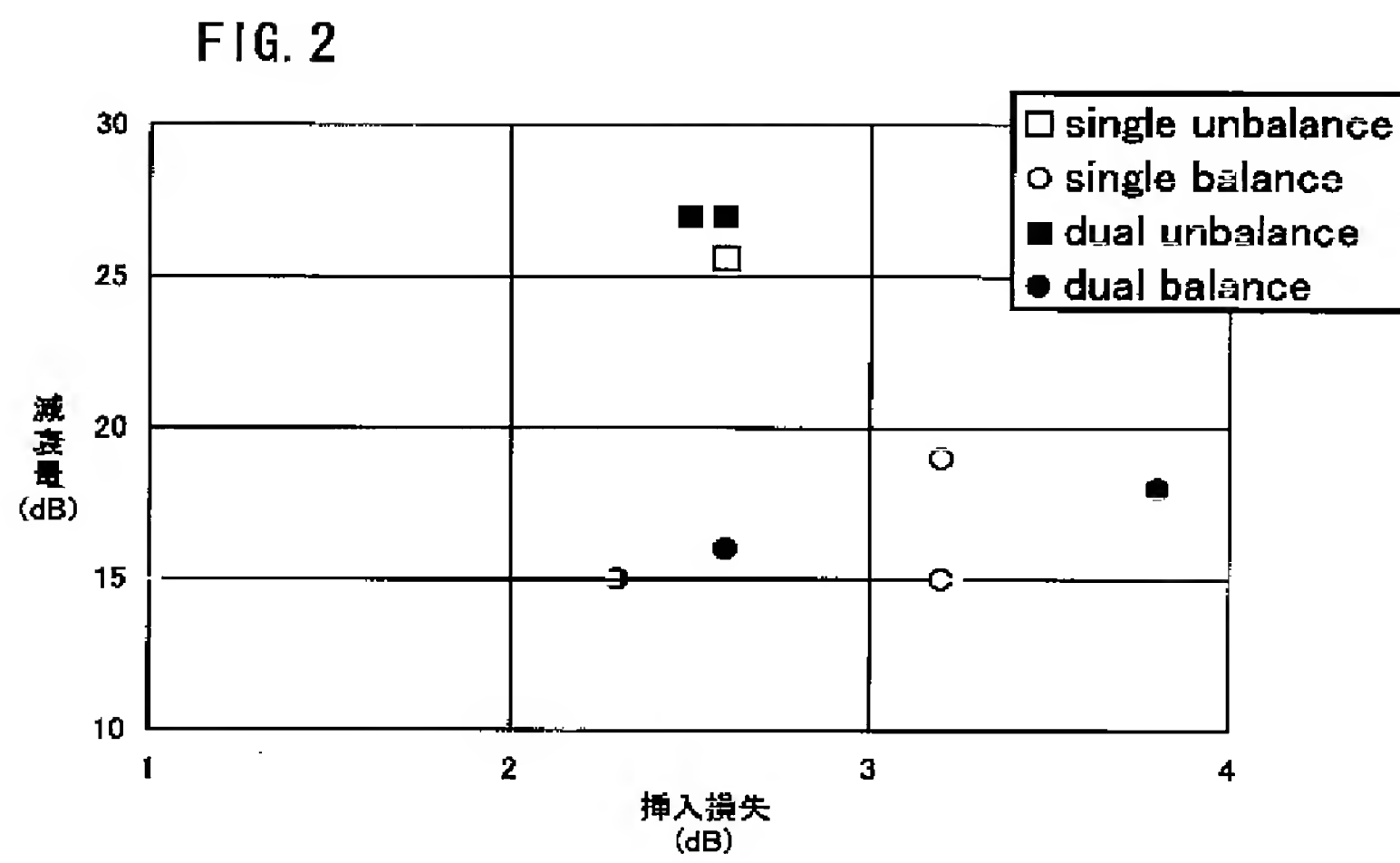


【図5】



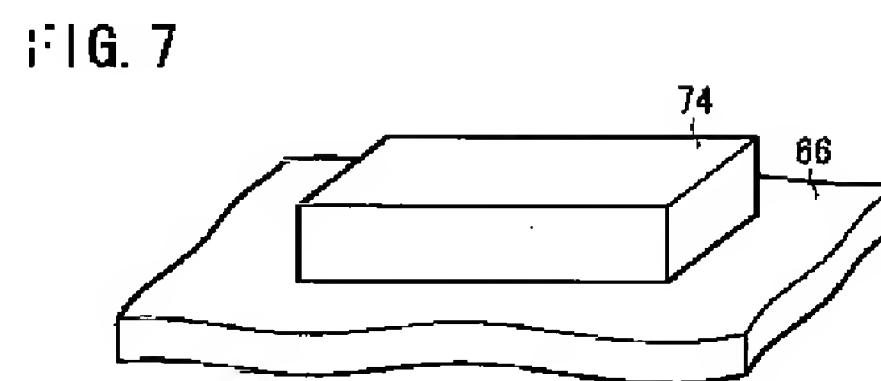
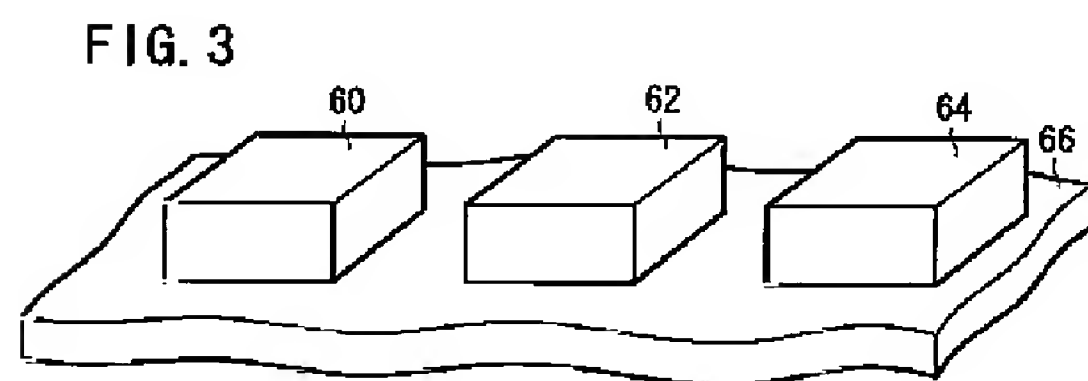
【図2】

【図6】

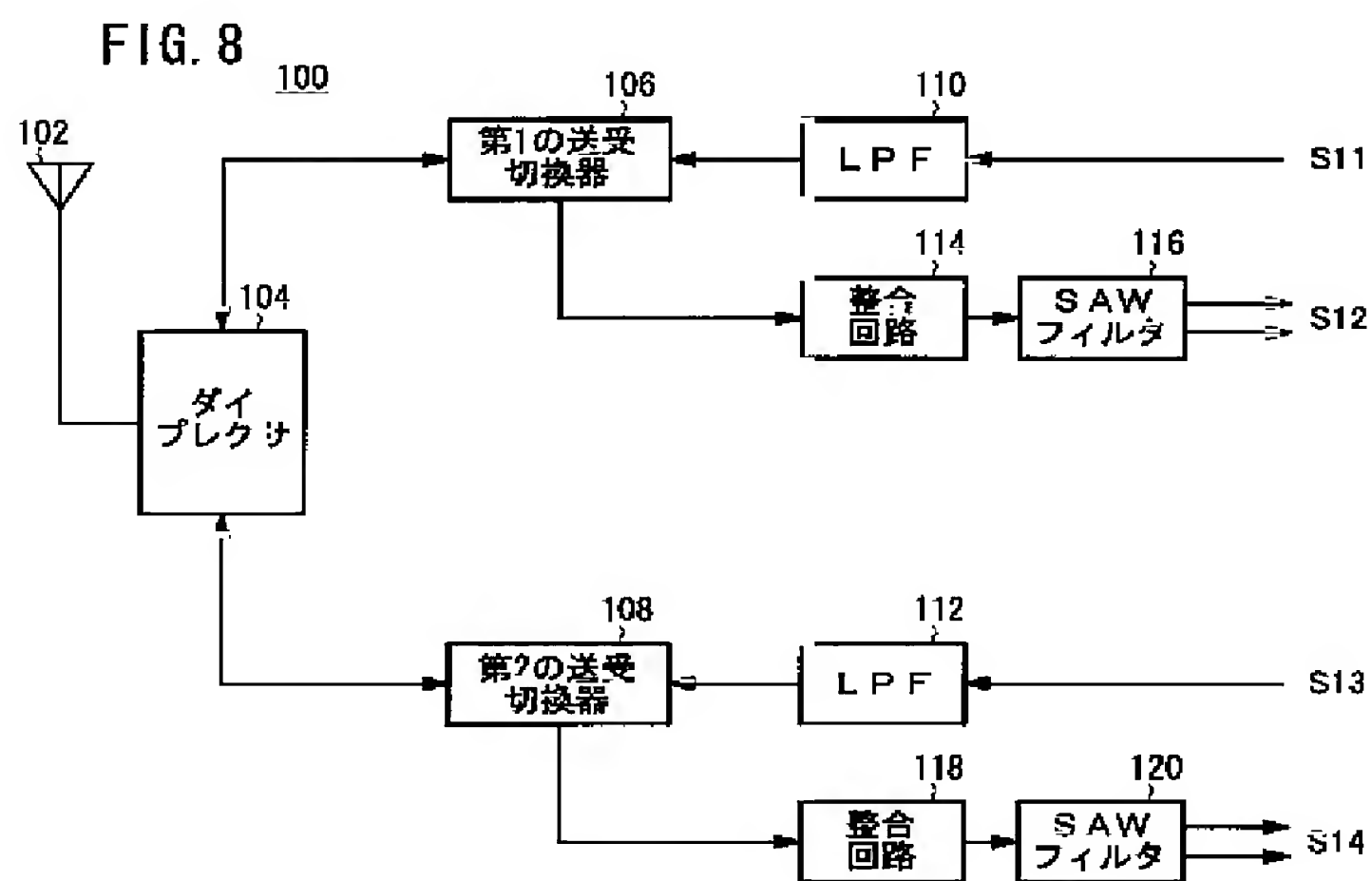


【図3】

【図7】



【図8】



フロントページの続き

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